SUMMARY AND CONCLUSION
6. SUMMARY AND CONCLUSION

Slums are generally situated in adverse environmental inhumane areas. Since these are self occupied areas they are denied of the basic amenities of life. A high degree of insecurity exists in every aspect of life as domicile, socio-economic status which in turn has a bearing on nutritional status. Evidences suggest that the health and nutritional profile of the slum residents are below the developing country standards. The present study was undertaken to study effect of instabilities prevalent in urban slums on the growth pattern of the children over a period of time.

An overview of the entire study in terms of situation analysis, growth pattern, nutritional status and associative factors of children and their mothers is depicted in Fig. 6.1-3. The salient features of the study are summarized below.

Situation Analysis

- Ghousianagar, a densely populated Muslim resident slum was selected for the study. Children of 2 to 11 years attending the school were enrolled for the study.
- A total of 676 children from 397 families were initially selected. Information on the economic status, literacy status, demography, housing conditions, occupation profile, hygiene in and around the houses etc were elicited by interviewing the mothers with a pre-tested proforma.
- The quality of construction of the houses were poor, the dimension of majority of the houses was in the range of 10' X 18'. Around 1/5th of the houses comprised of only one room, around 1/10th had 2 and 3 rooms and 1/4 of them had four rooms. Around half of the selected families lived in a rented house. There were no separate toilets in each house.
- Water from public sources was utilized, supply was scarce. Around 1/4th of the houses were electrified.
- Food stuffs available in the area were of substandard quality. Only seasonal fruits and vegetables were available, meat and meat products were unhygienically maintained.
- Health set-ups of government and non-government organizations were quite approachable. Transport facilities to city and near by recreational centers were quite satisfactory.
- Mosques served as centers for socio-cultural decisions.
Fig. 6. An overview of the major findings of the investigation

Fig. 6.1. Situation Analysis

**BASELINE INFORMATION**

### Socio-economic status

1. **Literacy level** -
   - Low - 87% women
   - 78% men

2. **Employment pattern**
   - Unskilled labour
     - 50% men
     - 100% women

3. **Housing conditions**
   - Moderately vulnerable

4. **Water, hygienic facilities**
   - Extremely vulnerable

5. **Health facilities and Governmental support**
   - Moderately vulnerable

6. **Gender status** - low

### Nutritional status of children (n=676)

1. **Anthropometry**
   - Underweight - 37%
   - Wasting - 11%
   - Stunting - 54%

2. **Biochemical**
   - Anemia - 60-79%

3. **Dietary intake**
   - Food frequency - low in protective foods
   - Iron contribution - 10-12% from Animal sources
   - Energy protein ratio - good
   - Quantity adequacy - protein
   - Inadequacy >70%
   - <70% iron, vitamin A

### Maternal Characteristics (n=271)

1. **Nutritional status** -
   - CED (17%) and overnutrition (24%)

2. **Nutrition knowledge aspects**
   - Moderate to high
   - General nutrition - 80%
   - Child care and feeding - 89%
   - Health - 80%
   - Hygiene and sanitation - 77%
   - Parental care - 88%
   - Nutrient intake - Adequate in macronutrients and inadequate in micronutrients

3. **Female autonomy** - poor.
A non-government organization was running an Anganwadi (day care center) for preschool children, and a higher primary school for older children. It was also offering training in income generating activities as tailoring embroidery etc to young women. Adult education activities were also carried out.

Around 50% of women and 40% of men of the selected families were illiterate. Around $\frac{1}{3}^{rd}$ of them had attained 5-7 years of education and the remaining around 8-10 years.

The major occupations through which the residents were earning livelihood were labour, vending of fruits and vegetables and driving private vehicles. Their earnings were highly unstable. A majority of women (77%) were engaged in income generating activities.

Differential vulnerability index of the selected families revealed their housing, health facilities, health status, support by government, educational levels to be moderately vulnerable and employment pattern, financial security, and hygienic conditions to be extremely vulnerable.

**Assessment of nutritional status**

- Hemoglobin levels of a sub-sample of children assessed by cyanmethemoglobin method revealed 93% of the children to be anemic. The prevalence showed a trend with age, i.e. milder forms decreasing and severe forms increasing with age.

- Weight for age of the children was good indicator of nutritional status. Prevalence of moderate underweight declined and severe underweight increased with the increasing age. The differences between the different age groups were found to be extremely significant.

- Proportion of children with normal height for age increased with increase in economic levels. Moderate and severe forms of stunting was comparatively lower in high economic groups.

- Proportion of children with normal weight/height ratio decreased with increasing economic levels. Severe form of wasting was high in high income group. An inverse relation existed between wasting and economic levels.

- Weights of the children in relation to age was found to reduce with improvement in maternal literacy levels. Moderate degree of underweight was higher among children of literate mothers. However, the differences between the groups were non-significant.
• Heights of the children of illiterate mothers was better than those of literate mothers and stunting was comparatively higher among those of literate mothers but the differences between the groups were non-significant.

• The weight/height ratios improved with that of maternal literacy status, however the improvement evidenced was not of a significant extent.

• Weight/age or underweight among children was found to be almost similar among different sized families indicating that current nutritional status was not influenced by family size.

• Height/age of the children was better among children of small sized families, stunting increased with increase in the family size indicating that family size determines height of the children.

• Weight for height ratios of the children of small sized families were higher and the severity of wasting increased with family size. The differences in the pattern between the groups were extremely significant.

• Weight/age of the children was found to parallel with their mother's body mass index, being higher among those of 'normal', and above and lower among those of chronic energy deficiency. The extent of variations were found to be highly significant.

• Height attainment of the children was better among those of 'normal' and 'obese' mothers. But moderate stunting was higher among those of chronic energy deficient and obese mothers. However the differences in the pattern of height measurements were non-significant.

• A higher proportion of children with normal weight for height ratios belonged to those of normal mothers and the 'wasted' children were of 'chronic energy deficient' mothers. The association was highly significant.

• Around 1/10th of the children had normal nutritional status, whereas 2/3rd were subjected to moderate and severe undernutrition. Around 1/5th were underweight and stunted implying the prevalence of both long-term and current under-nutrition. 5% of the children were underweight and wasted and 3% were suffering from all three forms of undernutrition or multiple anthropometric failure.

Growth pattern of children - Longitudinal study

• Weights of the children were recorded at half yearly intervals for a period of four years. The weight/age measurements of the children of 2-11 years were found to be below 50th centile of NCHS standards in all the four years.
Fig. 6.2. Growth pattern of children: A longitudinal profile through anthropometry

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Observations</th>
</tr>
</thead>
</table>
| WEIGHT                        | - Weight for age curves of 2, 3 and 6 years females was >3rd centile, others were ≤3rd centile.  
|                               | - Weight velocity was better among girls and age specific.                   |
|                               | - Prevalence of underweight increased significantly with age.               |
|                               | - No sex differences existed in prevalence of underweight.                  |
| HEIGHT                        | - Height curves of 2-8 year children matched 10th centile, 9-11 year group was <3rd centile.  
|                               | - Height velocity was higher in 2-4 year and 9 year groups.                 |
|                               | - Prevalence of stunting remained stable over 4 years.                      |
|                               | - No sex differences existed in stunting.                                   |
| WEIGHT/HEIGHT                 | - Weight/height ratios improved with age.                                   |
|                               | - Occurrences of wasting increased significantly over four years.           |
|                               | - No sex differences existed in wasting.                                    |
| MID UPPER ARM CIRCUMFERENCE  | - Percentage of standard of MUAC deteriorated significantly over four years period.  
|                               | - Percentage of standard of MUAC decreased with increasing age.             |
|                               | - No sex differences existed in percent MUAC.                               |
| SKINFOLD THICKNESS            | - Percentage of standard of SFT decreased with increasing age.              |
|                               | - Percentage of standard of SFT decreased over four years.                  |
|                               | - SFT was better among males.                                              |
The extent of differences between the growth line of the children and the standard curve widened with increasing age of the children in both sexes.

Females exhibited a better growth pattern than their male counterparts and the extent of differences were higher among eleven year group. The pattern of growth rate was age and sex specific, the weights of the female children was lower among 3-6 year group, overlapped with that of the 7-9 year group and excelled than their male counterparts in 10-11 year group.

The growth of the females in comparison to various centiles of NCHS standards revealed that the growth lines of children initiated between 10-50th percentiles in different age groups slid down or dropped to ≤ 3rd centile in the span of four years. However girls of a 2, 3, 5 and 6 year groups, though showed a deteriorative or a negative shift, were comparatively better than their male counterparts with their curves ending at a slightly higher percentile.

The deteriorative shift in the growth pattern of the children over four years as per Gomez classification reflected more clearly. A shift in the degree of nutritional status was age oriented, the 2-4 year group shifted from 'normal' to 'mild' malnutrition, 5-8 year group from 'mild' to 'moderate' and 9-11 year group from 'moderate' to 'severe' degrees of malnutrition.

The average weight increment of the four year period computed in terms of kg/year was found to be 2.6 and 3.6 times lower than the standard values in the girls and boys respectively.

The height measurements of two and three year olds over lapped with the 50th centile of NCHS standards but deviated then onwards. The linear growth line of children from 4-11 years were well below the standards in both the genders. The extent of differences in growth line of children and the standards widened with increasing age.

Average height measurements of the children was better maintained during the follow-up period than weights. The height line of the children of most groups though shifted down reverted back to 10th centile or ≥ 5th centile in four year period.

The average percentage of standard of heights was found to be ≥ 90% in 2-8 years group beyond which a 2-6% decrease was observed. As per Waterlow's classification, 2-8 year group were found to exhibit normal heights, but 9-11 year group exhibited mild stunting. There was a negative change or deterioration in the degree of stunting over four year period.
• The height status of the children assessed based on the Z scores was found to be better among males than female children.

• The proportion of children with normal height for age increased by 6-8% in the second and third years of follow-up compared to first year with a 3 and 7% increase in the stunting during the same period.

• Height increment of the study period in cm/year was found to be comparable with the standard height among boys but in girls it was lower among girls up to eight years but the trend got reverted beyond that age.

• The average height measurements of the boys (2-10 years) and girls (except 9 and 10 year group) was found to be higher than that of the rural children of low socio-economic groups.

Dietary Assessment

• Food and nutrient intake of the children was assessed qualitatively by ‘food frequency’ method, at family level and quantitatively by ‘twenty four recall method’ at individual level on two consecutive days.

• The iron content of the diets of children ranged from 3.8 to 9.0mg in the age group of 4-14 years. The proportion of iron derived from various food groups were cereal, 27-40%; pulses, 15-19%; vegetables, 29-41% and meat and meat products, 7-10% in a day’s diet.

• Unequal distribution of food between mothers and their children could be attributed to various other factors as large family size, lack of knowledge regarding child care etc. It shows that factors other than food availability also influence food intake both at family and community level.

• In dietaries of 20% of the children 100% of the protein was derived from plant foods. In 28% of the children, 10-20% of protein was derived from animal foods, while in another 18 and 22% were deriving 20-40 and 40-60% of protein from animal foods respectively. A small proportion of the children were deriving more than half of their proteins from animal sources.

• Energy protein ratio of the dietaries of the children of all age groups were above the ideal ratio indicating that they are deriving adequate calories from proteins.

• Diets of 1/5th of the children was adequate in both protein and calories, it was inadequate in both in 1/3rd of children. Dietaries of 40% of the children was adequate in protein and inadequate in calories.
The adequacy ratios of protein and calories in the dietaries varied significantly by the age of the children. Proportion of children with inadequacy of both protein and calories doubled from youngest to oldest age group with adequate protein and inadequate calories decreased by three times from younger to older age group. The adequacy pattern was significantly better among female children.

The ratio of adequacy pattern of calories and protein showed no trend with nutritional status of the children.

The adequacy ratio of protein and calories was not found to be influenced by maternal literacy level but was found to be significantly influenced by maternal BMI.

The adequacy ratio of protein and calories varied significantly between different economic groups.

The intake of cereals showed a linear increase with increase in age from 5-12 years among girls and up to 13 years among boys. Consumption of pulses showed no trend with age, but adequacy level was better among children of higher age groups. Intake of fat also increased with increasing age.

Intake of green leafy vegetables was below 40% of RDA but was comparatively better among children of higher age groups. Intake of other vegetables was higher than adequacy in all age groups except 5-6 year group. The consumption of roots and tubers was found to increase with increasing age.

Consumption of milk and milk products was negligible among all age groups of both genders. Sugar and jaggery consumption was very less.

The average consumption of meat and meat products was very less but this should be viewed in relation to frequency.

The percent adequacy of all the nutrients was higher among girls but the extent of differences were significant for calories, iron and riboflavin.

Percent adequacy of calories and B complex vitamins increased significantly with age but protein decreased with age, other nutrients showed no trend with age.

The adequacy level of fat, calcium, iron and β-carotene decreased with increasing family size but other nutrients showed no change.
• No sex differences existed in the proportion of iron derived from different food groups.

• Nutrient adequacy of children was viewed in relation to that of their mother's to observe if any similarities existed. The adequacy level of calories of mother's was significantly higher than their children's and higher than RDA. Protein content was higher than RDA in both children and their mothers, but comparatively mother's intake was higher. Calcium intake of mothers was twice higher than that of children's intake. Iron intake of both mother's and their children was below 40% of RDA. Percent adequacy of retinol was higher among children. Adequacy level of B-complex vitamins were significantly lower among children than their mother's intake.

• Percent adequacy of calories, fat, calcium, β-carotene, riboflavin contents decreased as the nutritional status of the children deteriorated from normal to severe degree of undernutrition, while protein followed the reverse trend and other nutrients showed no trend.

• The adequacy level of calories, visible fat, iron, thiamine, riboflavin, niacin were lower among children of chronic energy deficient mothers compared to those of normal and overnourished mothers.

• The adequacy level of the nutrients of the children was significantly lower than that of their mothers.

• The adequacy level of calories, B-complex vitamins and iron increased as the economic level improved while protein decreased in the same order. The intake of other nutrients showed no trend.

• The average intake of calories, fat, niacin, protein, β-carotene, were higher among children of 'level 1' literate mothers, while iron, thiamine, riboflavin and calcium intake of the children reduced with increasing literacy level indicating that maternal literacy levels has no influence on the nutrient intake of children.

**Nutritional status of children and Associative factors**

• Reproductive history of the women in the selected families revealed that around 43% of women married below the age of 18 years, fertility rates were quite high, 24 to 38% of the families had 3-6 children. In 40% of the families the birth interval between the children was less than 2 years.
Fig. 6.3. Nutritional status of children and associative factors

- **NUTRITIONAL STATUS**
  - Weight for height ratio
  - Weight for age and height for age
  - Height for age, weight for height
  - Height for age, weight for age
  - Weight for height (females)

- **ASSOCIATIVE FACTORS AND TYPE OF ASSOCIATION**
  - MATERNAL LITERACY STATUS
    - No association
  - ECONOMIC STATUS
    - Protein –ve association
    - Micronutrients +ve association
  - FAMILY SIZE
    - But non-significant
  - AGE
    - Protein –ve, all others +ve association

- **DIETARY ADEQUACY**
  - Energy, B-complex vitamins and iron high among females
  - All non-significant except energy
  - Protein –ve and others no association

Note - +: Positive association, -: negative association.
• The nutrition knowledge of majority of the mothers was poor. Food intake of 86% of the mothers during pregnancy was reported to be unchanged or decreased compared to their pre-pregnancy state.

• Around 90% of the mothers were not aware of the purpose of weighing their children nor their weights. Half of them were not interested to know whether their child was growing well or not.

• In around 90% of the families the younger children were fed in the same plate as their siblings and 63% of them said that they were feeding their children 2-3 times a day or whenever time permits.

• Majority of the women were aware that breast feeding was important. They were practicing it as a custom and were not aware of the nutritional or health significance.

• Around 90% of the mothers were aware that colostrum has to be fed to the child and 64% of them had nursed their infants within 24 hours of birth. The reason stated by the mothers for feeding colostrum was the advice of a health professional.

• Duration of breast feeding by the mothers was satisfactory. Around 60% of the mothers were aware of the ideal age of introducing the supplementary foods and half of them felt that it was for good health.

• Around 60% of the mothers were aware of the importance of giving ORS during diarrhea and a small portion of them knew the correct proportion of salt and sugar to be used.

• Around 1/3rd of the mothers were seeking medical advice for managing the child's diet during illness while the remaining were giving the family diet.

• Almost all children were immunized but 79% completed the profile. Among the mothers 96% had received 'Tetvac' (Anti-tetanus) injections during their pregnancy. Around 90% of the mothers had undergone antenatal check-ups during pregnancy of which 57% had visited the doctor only once or twice. Around 90% of them had delivered in hospitals.

• Hygiene of the houses, placement of food stuffs and clean cooking practices were observed in 3/4th of the families. Personal hygiene of the children was not satisfactory in majority of them.
• Social status of the women in the families was reported to be good, but the investigators' observations revealed it to be poor which shows the ignorance of the women about real 'female autonomy'.

• Parental care of the children in terms of education, providing good food, seeking medical aid during sickness and providing recreation was satisfactory in half of the families.

CONCLUSIONS AND RECOMMENDATIONS

The socio-economic situation of the slum residents was highly insecure due to irregular labour opportunities. In majority of the families, women were involved in income generating activities and their families were managed with their earnings. Female autonomy was poor. The limiting food resources due to low socio-economic status, accompanied by large family size led to poor dietary intake, especially inadequate calories and micronutrients led to poor nutritional status of the children in growing age. The growth profile of the children was found to be poor especially among older age groups due to mere negligence. The prime growth indicators of the children i.e. the heights and weights over a period of four years suggested a deteriorative pattern in almost all age groups and children were placed in the <3rd centile of NCHS standards. A deteriorative pattern in four-year period in this particular group was suggestive of the arrival of a younger sibling, diversion of attention towards younger child and consideration of the older child as 'old' though the child is still younger and needs attention. To bring an improvement in the nutritional status of the children in areas of high social adversity, poor health, nutritional status and knowledge of mother, poor autonomy of women, bigger family size and social insecurity for women, a total revolutionary approach is needed. For improving health and nutritional status of the children and to raise socio-economically and nutritionally healthy citizens for a future nation, the male folk need to be sensitized regarding their family and societal responsibilities, significance of health and nutritional profile and female autonomy. In addition, the mothers need to be educated on the significance of health, nutrition, hygiene and child care. This can be achieved by the combined efforts of the various societal elements in the settings of urban slums as depicted in Fig. 6.4.
Fig. 6.4. AN EIGHT ELEMENT OPERATIVE MODEL FOR IMPROVING HEALTH AND NUTRITION IN URBAN SLUMS

**Improve Economic Level**
- Diverting welfare programs
- Provide basic amenities
- Create job opportunities

**Improve Food Security**
- Providing part of wages as food
- Support to avoid heavy interest credits

**Improve Food Security**
- Encourage family planning
- Adherence of immunization schedules
- Awareness about HIC/AIDS
- Maintain public hygiene and sanitation

**Build a Healthy and Good Community**
- Encourage selection of nutritious foods
- Sow the seeds of hygiene and sanitation
- Bring awareness regarding ill effects of tobacco, alcohol and drug abuse
- Develop moral values

**Build a Healthy and Crime Free Society**
- Sensitize male about family responsibility
- Enlighten moral values
- Discourage polygamy, drug and alcohol abuse

**Build a Socio-Economically Sound Society**
- Aware male's self identity
- Encourage positive exploitation of women in income generation
- Provide females a platform to exhibit skills and market to encash

**Through Organisations**
- Can get the eligible benefits through government & NGOs
- Develop healthy communication channels
- Present anti-social elements

**Attach incentives for active participation**